

Meet Dr. John C. Warner

FOUNDER, WARNER BABCOCK INSTITUTE FOR GREEN CHEMISTRY (WBI)

BY SANDY LENDER



John C. Warner

WITH A BACHELOR of Science in Chemistry from the University of Massachusetts Boston and a Ph.D. in chemistry from Princeton University, John C. Warner is an industrial chemist presenting a unique set of skills to the asphalt industry. He co-authored the book *Green Chemistry: Theory and Practice* with Paul T. Anastas, from which the Environmental Protection Agency uses the concept of the 12 principles of green chemistry.

In addition to founding WBI with Jim Babcock, his inventions have served as the foundation for four other companies to promote environmentally positive practices. With more than 300 patents,

100 publications, and a handful of prestigious awards from presidents and international entities, John stays engaged and excited about his profession.

John's wonder and creativity have brought a duet of plant-based rejuvenating products to the asphalt industry with Delta-S and Delta Mist, the former of which is being tested at the NCAT Test Track and field trials in Minnesota, New Hampshire, Texas, and beyond. They began in his WBI invention factory and are marketed through his asphalt pavement technologies company Collaborative Aggregates LLC, a NAPA Associate Member.

What was the catalyst for founding the Warner Babcock Institute for Green Chemistry?

Jim and I wanted to show the world that chemistry and materials could be invented that had great performance and reasonable cost while at the same time demonstrate minimal impact on human health and the environment.

What does a typical workweek look like for you?

I am wearing many hats. While I continue to be engaged in various WBI activities, I am currently SVP of chemistry for the company Zymergen, where I enjoy being in the thick of balancing competing molecular forces to choreograph the materials properties to solve important problems, knowing that the work we are doing will make a difference in people's lives one day. I give keynote talks almost every week at various international conferences. My amazing wife Amy Cannon runs the non-profit organization Beyond Benign. And my five beautiful children keep me smiling.

How do the principles you codified shape WBI's day-to-day projects?

My inventive teams approach every project through the perspective of the 12 principles. We start by asking ourselves: "How can we minimize the negative impacts on human health and the environment as we think of the various molecular approaches?" For Delta-S, we wondered, "How can we use plant-based materials that are completely non-toxic, that lower the processing temperature while improving the ultimate performance?" It is certainly not easy, and not many scientists have the skills to invent using the 12 principles. But the team refuses to do it any other way.

How might the concept of "predictive environmental mechanisms" assist chemists in the asphalt industry to develop (or incorporate) safe, environmentally benign chemicals?

There are many tools available to anticipate potential negative impacts of various chemistries on the environment. The key is to fold this analysis into the very beginning of research and development. By doing so, we make better products and enjoy a faster time to market.

What is "molecular psychology," and how does it relate to creating products for the asphalt industry?

The reason the traditional chemical industry heats things under high temperature, puts them under high pressure, and uses nasty reagents is because we are "forcing" the molecules to do things they are inherently not predisposed to do. If instead, we seek to create molecular systems based on what the molecules are predisposed to do (molecular psychology) then we do not need to use the high temperatures, pressures, and harsh reagents.

As the asphalt industry embraces climate goals, how do you see products like Delta-S assisting us in more recycled product use in mix design?

Obviously, I have a bias here, but in my opinion it's our best chance to accomplish net zero. Better performance, better cost, less energy, and non-toxic. It is designed with the 12 principles of green chemistry, by the team that created them. 🌱